

**Course Title:** 8th Grade Earth and Physical Science

**Board Approval Date:** January 17, 2019

**Credit / Hours:** 1.0

**Course Description:**

The science program in eighth grade is aligned to the PSSA assessment anchors and eligible content which will provide text dependent, digital simulations, and hands-on lab based experiments in the following content areas: Nature of Science, Physical Science, and Earth & Space Science.

**Learning Activities / Modes of Assessment**

Checklists/Status Report  
Collaborative Projects  
Construction of Models  
Content Quizzes  
Data Analysis  
Digital “Posters”/Projects  
Direct Instruction  
Do Nows (Bellringers)  
Exit Tickets  
Extension Activities  
Independent Work  
Kahoot, Quizziz, & Quizlet  
Kinesthetic Activities  
Partner Work  
pHet Simulations  
PSSA Released Items  
Real World Applications  
Schoology Assignments  
Science Scenarios  
Small Group  
Stations (Labs)  
Study Island  
Teacher-created Case Study  
Teacher Demonstrations  
Teacher Observation  
TedEd Response  
Think Pair Share  
Whole Group

## **Instructional Resources:**

Textbooks  
Lab Materials  
District Assessments  
Study Island  
Online Practice Tools  
DCNR Publications  
USGS Publications  
State Standards/Assessment Anchors  
District Approved Apps

<b>KNOW</b>	<b>UNDERSTAND</b>	<b>DO</b>
<b>S8.A.1 Reasoning and Analysis</b>	Explain, interpret and apply scientific, environmental, or technological knowledge in a variety of formats (e.g., visuals, scenarios, graphs)	<b>S8.A.1.1.1</b> Distinguish between a scientific theory and an opinion, explaining how a theory is supported with evidence, or how new data/information may change existing theories and practices.  <b>S8.A.1.1.2</b> Explain how certain questions can be answered through scientific inquiry and/or technological design.  <b>S8.A.1.1.3</b> Use evidence, such as observations or experimental results, to support inferences about a relationship.  <b>S8.A.1.1.4</b> Develop descriptions, explanations, predictions, and models using evidence.

<b>S8.A.1 Reasoning and Analysis</b>	Identify and explain the impacts of applying scientific, environmental, or technological knowledge to address solutions to practical problems.	<b>S8.A.1.2.1</b> Describe the positive and negative, intended and unintended, effects of specific scientific results or technological developments (e.g., air/space travel, genetic engineering, nuclear fission/fusion, artificial intelligence, lasers, organ transplants). <b>S8.A.1.2.2</b> Identify environmental issues and explain their potential long-term health effects (e.g., pollution, pest controls, vaccinations). <b>S8.A.1.2.3</b> Describe fundamental scientific or technological concepts that could solve practical problems (e.g., Newton's laws of motion, Mendelian genetics). <b>S8.A.1.2.4</b> Explain society's standard of living in terms of technological advancements and how these advancements impact on agriculture (e.g., transportation, processing, production, storage).
--------------------------------------	--	---

<b>S8.A.1 Reasoning and Analysis</b>	Identify and analyze evidence that certain variables may have caused measurable changes in natural and human-made systems.	<b>S8.A.1.3.1</b> Use ratio to describe change (e.g., percents, parts per million, grams per cubic centimeter, mechanical advantage).  <b>S8.A.1.3.2</b> Use evidence, observations, or explanations to make inferences about change in systems over time (e.g., carrying capacity, succession, population dynamics, loss of mass in chemical reactions, indicator fossils in geologic time scale) and the variables affecting these changes.  <b>S8.A.1.3.3</b> Examine systems changing over time, identifying the possible variables causing this change, and drawing inferences about how these variables affect this change.  <b>S8.A.1.3.4</b> Given a scenario, explain how a dynamically changing environment provides for the sustainability of living systems.
--------------------------------------	--	--

<b>S8.A.2 Processes, Procedures, and Tools of Scientific Investigations</b>	Apply knowledge of scientific investigation or technological design in different contexts to make inferences or solve problems.	<b>S8.A.2.1.1</b> Use evidence, observations, or a variety of scales (e.g., mass, distance, volume, temperature) to describe relationships.  <b>S8.A.2.1.2</b> Use space/time relationships, define concepts operationally, raise testable questions, or formulate hypotheses.  <b>S8.A.2.1.3</b> Design a controlled experiment by specifying how the independent variables will be manipulated, how the dependent variable will be measured, and which variables will be held constant.  <b>S8.A.2.1.4</b> Interpret data/observations; develop relationships among variables based on data/observations to design models as solutions.  <b>S8.A.2.1.5</b> Use evidence from investigations to clearly communicate and support conclusions.  <b>S8.A.2.1.6</b> Identify a design flaw in a simple technological system and devise possible working solutions.
---	---	---

**S8.A.2 Processes, Procedures, and Tools of Scientific Investigations**

Apply appropriate instruments for a specific purpose and describe the information the instrument can provide.

**S8.A.2.2.1**

Describe the appropriate use of instruments and scales to accurately and safely measure time, mass, distance, volume, or temperature under a variety of conditions.

**S8.A.2.2.2**

Apply appropriate measurement systems (e.g., time, mass, distance, volume, temperature) to record and interpret observations under varying conditions.

**S8.A.2.2.3**

Describe ways technology (e.g., microscope, telescope, micrometer, hydraulics, barometer) extends and enhances human abilities for specific purposes.

<b>S8.A.3 Systems, Models, Patterns</b>	Explain the parts of a simple system, their roles, and their relationships to the system as a whole.	<p><b>S8.A.3.1.1</b> Describe a system (e.g., watershed, circulatory system, heating system, agricultural system) as a group of related parts with specific roles that work together to achieve an observed result.</p> <p><b>S8.A.3.1.2</b> Explain the concept of order in a system [e.g., (first to last: manufacturing steps, trophic levels); (simple to complex: cell, tissue, organ, organ system)].</p> <p><b>S8.A.3.1.3</b> Distinguish among system inputs, system processes, system outputs, and feedback (e.g., physical, ecological, biological, informational).</p> <p><b>S8.A.3.1.4</b> Distinguish between open loop (e.g., energy flow, food web) and closed loop (e.g., materials in the nitrogen and carbon cycles, closed-switch) systems.</p> <p><b>S8.A.3.1.5</b> Explain how components of natural and human-made systems play different roles in a working system.</p>
---	--	--



<b>S8.A.3 Systems, Models, Patterns</b>	Apply knowledge of models to make predictions, draw inferences, or explain technological concepts.	<b>S8.A.3.2.1</b> Describe how scientists use models to explore relationships in natural systems (e.g., an ecosystem, river system, the solar system).  <b>S8.A.3.2.2</b> Describe how engineers use models to develop new and improved technologies to solve problems.  <b>S8.A.3.2.3</b> Given a model showing simple cause and effect relationships in a natural system, predict results that can be used to test the assumptions in the model (e.g., photosynthesis, water cycle, diffusion, infiltration).
---	--	--

<b>S8.A.3 Systems, Models, Patterns</b>	Describe repeated processes or recurring elements in natural, scientific, and technological patterns.	<b>S8.A.3.3.1</b> Identify and describe patterns as repeated processes or recurring elements in human-made systems (e.g., trusses, hub-and-spoke system in communications and transportation systems, feedback controls in regulated systems).  <b>S8.A.3.3.2</b> Describe repeating structure patterns in nature (e.g., veins in a leaf, tree rings, crystals, water waves) or periodic patterns (e.g., daily, monthly, annually).
---	---	---

**S8.C.1 Structure, Properties, and Interaction of Matter and Energy**

Explain concepts about the structure and properties (physical and chemical) of matter.

**S8.C.1.1.1**

Explain the differences among elements, compounds, and mixtures.

**S8.C.1.1.2**

Use characteristic physical or chemical properties to distinguish one substance from another (e.g., density, thermal expansion/contraction, freezing/melting points, streak test).

**S8.C.1.1.3**

Identify and describe reactants and products of simple chemical reactions.

**S8.C.2 Forms, Sources,  
Conversion, and Transfer of Energy**

Describe energy sources, transfer of energy, or conversion of energy.

**S8.C.2.1.1**

Distinguish among forms of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) and sources of energy (i.e., renewable and nonrenewable energy)

**S8.C.2.1.2**

Explain how energy is transferred from one place to another through convection, conduction, or radiation.

**S8.C.2.1.3**

Describe how one form of energy (e.g., electrical, mechanical, chemical, light, sound, nuclear) can be converted into a different form of energy.

**S8.C.2 Forms, Sources,  
Conversion, and Transfer of Energy**

Compare the environmental impact of different energy sources chosen to support human endeavors.

**S8.C.2.2.1**

Describe the Sun as the major source of energy that impacts the environment.

**S8.C.2.2.2**

Compare the time span of renewability for fossil fuels and the time span of renewability for alternative fuels.

**S8.C.2.2.3**

Describe the waste (i.e., kind and quantity) derived from the use of renewable and nonrenewable resources and their potential impact on the environment.

**S8.C.3 Principles of Motion and Force**

Describe the effect of multiple forces on the movement, speed, or direction of an object.

**S8.C.3.1.1**

Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced).

**S8.C.3.1.2**

Distinguish between kinetic and potential energy.

**S8.C.3.1.3**

Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g., simple machines, hydraulic systems).

**S8.D.1 Earth Features and Processes that Change Earth and Its Resources**

Describe constructive and destructive natural processes that form different geologic structures and resources.

**S8.D.1.1.1**

Explain the rock cycle as changes in the solid earth and rock types (igneous – granite, basalt, obsidian, pumice; sedimentary – limestone, sandstone, shale, coal; and metamorphic – slate, quartzite, marble, gneiss).

**S8.D.1.1.2**

Describe natural processes that change Earth's surface (e.g., landslides, volcanic eruptions, earthquakes, mountain building, new land being formed, weathering, erosion, sedimentation, soil formation).

**S8.D.1.1.3**

Identify soil types (i.e., humus, topsoil, subsoil, loam, loess, and parent material) and their characteristics (i.e., particle size, porosity, and permeability) found in different biomes and in Pennsylvania, and explain how they formed.

**S8.D.1.1.4**

Explain how fossils provide evidence about plants and animals that once lived throughout Pennsylvania's history (e.g., fossils provide evidence of different environments).

<p><b>S8.D.1 Earth Features and Processes that Change Earth and Its Resources</b></p>	<p>Describe the potential impact of human-made processes on changes to Earth's resources and how they affect everyday life.</p>	<p><b>S8.D.1.2.1</b> Describe a product's transformation process from production to consumption (e.g., prospecting, propagating, growing, maintaining, adapting, treating, converting, distributing, disposing) and explain the process's potential impact on Earth's resources.</p> <p><b>S8.D.1.2.2</b> Describe potential impacts of human made processes (e.g., manufacturing, agriculture, transportation, mining) on Earth's resources, both nonliving (i.e., air, water, or earth materials) and living (i.e., plants and animals).</p>
---	---	--



**S8.D.1 Earth Features and Processes that Change Earth and Its Resources**

Describe characteristic features of Earth's water systems or their impact on resources.

**S8.D.1.3.1**

Describe the water cycle and the physical processes on which it depends (i.e., evaporation, condensation, precipitation, transpiration, runoff, infiltration, energy inputs, and phase changes).

**S8.D.1.3.2**

Compare and contrast characteristics of freshwater and saltwater systems on the basis of their physical characteristics (i.e., composition, density, and electrical conductivity) and their use as natural resources.

**S8.D.1.3.3**

Distinguish among different water systems (e.g., wetland systems, ocean systems, river systems, watersheds) and describe their relationships to each other as well as to landforms.

**S8.D.1.3.4**

Identify the physical characteristics of a stream and how these characteristics determine the types of organisms found within the stream environment (e.g., biological diversity, water quality, flow rate, tributaries, surrounding watershed).

**S8.D.2 Weather, Climate, and Atmospheric Processes**

Explain how pressure, temperature, moisture, and wind are used to describe atmospheric conditions that affect regional weather or climate.

**S8.D.2.1.1**

Explain the impact of water systems on the local weather or the climate of a region (e.g., lake effect snow, land/ocean breezes).

**S8.D.2.1.2**

Identify how global patterns of atmospheric movement influence regional weather and climate.

**S8.D.2.1.3**

Identify how cloud types, wind directions, and barometric pressure changes are associated with weather patterns in different regions of the country.

**S8.D.3 Composition and Structure of the Universe**

Explain the relationships between and among the objects of our solar system.

**S8.D.3.1.1**

Describe patterns of earth's movements (i.e., rotation and revolution) in relation to the moon and sun (i.e., phases, eclipses, and tides)

**S8.D.3.1.2**

Describe the role of gravity as the force that governs the movement of the solar system and universe.

**S8.D.3.1.3**

Compare and contrast characteristics of celestial bodies found in the solar system (e.g., moons, asteroids, comets, meteors, inner and outer planets).

## 8th Grade Science - Pacing Guide

Course: 8th Grade Science

**Course Unit (Topic)  
Periods)**

**Length of Instruction (Class**

<b>Topic</b>	<b>Time Required</b>
Chemistry	30 Days
Energy Forms/Transformation	18 Days
Energy Resources/Environment	20 Days
Force and Motion	15 Days
Constructive and Destructive Processes	28 Days
Human Impacts	8 Days
Earth's Water Systems	18 Days
Weather, Climate, and Atmosphere	17 Days
Composition and Structure of the Universe	15 Days
PSSA	8 Days
Study Island BM	3 Days
<b>TOTAL DAYS</b>	<b>180 DAYS</b>